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Consortium Strong and Gaining Speed

Plant Operations Support program heads into new biennium with more members, resources

More state agencies, schools and ports have subscribed to the Plant Operations Support program in 1997, increasing membership by more than 30 percent. As the program grows, so do the opportunities for sharing information, resources and improving communications among the public service groups that make up the consortium. Additionally, major state agencies, including the Departments of Social and Health Services, Corrections, Transportation, General Administration, Military and Natural Resources, Parks and Recreation, and Washington State Patrol have re-subscribed to the program for the 1997-99 biennium. New state agency members include the School for the Deaf and the Liquor Control Board. The Ports of Edmonds and Ridgefield joined in May giving the ports a varied representation in size and geographic location. New school district members include Anacortes, Enumclaw, North Thurston and Ketchikan in Alaska.

"The diverse composition of the membership really enhances the program's ability to resolve and coordinate solutions to challenges and issues," said Fred King, assistant director for GA's Division of Engineering and Architectural Services. "We intend to remain focused on plant operations issues and be very responsive so we can retain the membership's confidence in the program."

The growth of the program is directly linked to the participation of its members and their willingness to share solutions, King says. He points to member participation and the attention the program received when it was signed into law by Governor Locke in April as significant proof of its health.

"The program provides an opportunity for members to share their extensive expertise and resources for mutual benefit," said King. "This is what we hoped it would do and we pledge our support to ensure its well-being into the next biennium."

The Plant Operations Support program provides a broad array of networking, technical assistance, research and consultation capabilities to improve maintenance practices or plant operations, solve systemic facility problems, and increase professional awareness and development. The program provides electronic and traditional clearinghouse functions, captures best practices in all facilities management arenas, and offers voluntary on-site assessment programs. It has enabled its membership to avoid more than \$755,000 in labor, equipment and other costs. Contact **Bob Mackenzie**, program manager (360)902-7257.

"We intend to remain focused on plant operations issues and be very responsive so we can retain the membership's confidence in the program."

Plant Operations Support program signed into law

Governor's signature makes it official

Governor Gary Locke signed House Bill 1066 into law on April 21, 1997, and by so doing codified the Plant Operation Support program. House Bill 1066, State Facilities Maintenance, added a new section to 43.82 RCW to read: **"The Department of General Administration shall provide information, technical assistance, and consultation on physical plant operation and maintenance issues to state and local governments through the operation of a plant operations and support program. The program shall be funded by voluntary subscription charges and service fees."**

The signing ceremony took place in the Governor's conference room and capped off a successful legislative effort by the bill's two sponsors, **Reps. John E. Pennington** (R-18th Dist.) and **Frank Chopp** (D-43rd Dist.). Support for the bill was provided by a number of state and local agencies, with notable efforts provided by the Office of Financial Management and Department of General Administration.

"The Plant Operations Support



Governor **Gary Locke** signs House Bill 1066, *State Facilities Maintenance*, in the Capitol on April 21, 1997 as bill sponsors and key supporters look on. (From left to right) Representative **Frank Chopp**, (D-Seattle); **Grant Fredricks**, deputy director, Department of General Administration; **Tom Henderson**, capital budget assistant, Office of Financial Management; **Bob MacKenzie**, manager, Plant Operations Support Program; and Representative **John Pennington**, (R-Battleground).

program was validated by the commitment and participation of its membership, and we are most appreciative of their confidence and support," said Grant Fredricks, deputy director for Department of General Administration. "The continued success of the program will be measured by the support it renders public facility managers. The Department of General Administration is committed to shouldering its

share of the work."

The program is staffed by a full-time manager and support staff and serves a consortium of public facility managers from state, educational, port and municipal agencies. It is a component of the Department of General Administration's Division of Engineering and Architectural Services and is funded by subscriptions of its membership.

The Plant Operations Support Consortium

Anacortes School District
Big Bend Community College
Clark College
Clark County
Enumclaw School District
Ketchikan School District, Alaska
Lewis County
Lower Columbia Community College
Marysville School District
Mukilteo School District
North Thurston School District
Oak Harbor School District

Pierce County
Port of Anacortes
Port of Edmonds
Port of Longview
Port of Ridgefield
Port of Sunnyside
Snohomish School District
Spokane Community College, Dist. 17
State of Alaska
Washington State Agencies:
Corrections

General Administration
Labor and Industries
Liquor Control Board
Military Department
Natural Resources
Parks and Recreation Commission
School for the Deaf
Social and Health Services
State Patrol
Transportation
Veteran's Affairs

In cooperation with:

Association of Higher Education Facilities Officers (APFA)
Association of Washington Cities (AWC)
National Association of State Facilities Administrators (NASFA)
Operations and Facilities Council (OFC)
Washington State Association of Counties (WSAC)
Washington Association of Maintenance and Operations Administrators (WAMOA)
Washington Public Ports Association (WPPA)
Washington Association of School Administrators (WASA)

Our warm welcome to the new members in green type and to those state agencies which have re-subscribed. We look forward to serving your facility and operations needs.



Plant Operations Support Web Site Has Moved!

Visit us at our new location:
www.ga.wa.gov/plant/plantops.htm



Shop Talk is a quarterly publication of the Plant Operations Support program. The newsletter is intended to be an informative and operationally-oriented medium for public facilities managers. Contents herein are also available on the program's web site at www.ga.wa.gov/plant/plantops.htm

We welcome feedback on the newsletter's contents and input from readers. We reserve the right to edit correspondence to conform to space limitations. Bob MacKenzie, program manager and editor, (360) 902-7257 or e-mail bmacken@ga.wa.gov. Karen Purtee serves as editorial assistant.

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Department of General Administration,
PO Box 41012, Olympia, WA 98504-1012. Marsha Tadano Long, Director.

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New ADA Facilities Program Manager “ready and willing” to assist maintenance professionals

by Carol Maher

The Americans with Disabilities Act is not just another set of codes.

If you have ever broken your leg or accompanied a relative in a wheel chair, or if you have ever guided someone who has a visual impairment or communicated with a person who is deaf, you may have already discovered the importance of the ADA. One out of every three of us will have a major physical disability in our lifetime. The Barrier Free Codes that are used to make our buildings accessible are not necessarily for “someone else” — they may be needed by you.

Imagine being blind and hearing the fire alarm. How would you leave the building? If proper signage is in place, you could identify the doorway, find the handle and reach up to the side of the door to “read” the Braille signage signifying that the entrance was a fire exit.

What if you were hard of hearing and couldn’t hear the fire alarm? How would you know to leave the building? Most buildings have strobe lights in main office spaces. These will work well as long as you are not in the bathroom when an alarm sounds. *Note: The strobe light may be a problem for someone who has epilepsy, as there has been at least one case when use of the strobe brought on an epileptic seizure.*

So what is the best way for us to interact?

The key words are “reasonable accommodations.” There may be

ways of removing barriers or adding accessible features that can greatly improve accessibility at little or no cost, and I’ll be glad to send you a copy of Barrier Free Codes on disk. I can help you find practical solutions to requests for reasonable

accommodations. I can also give you reasons for *not* complying to unreasonable requests. Older buildings do not need to comply to new building standards unless a major renovation is being considered. If something doesn’t make sense to you, call me and together we can make some sense of it.

Here is an example of a problem presented to my office.

“The fire alarm is very loud in our office, what does the ADA say about decreasing the sound level on the alarm?”

Answer: From The Americans with Disabilities Act Alternative Guidelines for Audible Alarms (WAC 51-30-93118), “Audible alarms shall exceed the prevailing equivalent sound level in the room or space by at least 15 decibels, or shall exceed any maximum sound level with a duration of 30 seconds by 5 decibels, whichever is louder. Sound level for alarms shall not exceed 120 decibels.”

A good idea would be to purchase alarms that are adjustable.



Carol Maher gives new meaning to the Americans with Disabilities Act

Carol has recently accepted the challenging assignment of ADA Facilities Program Manager for the Department of General Administration. She is a valuable resource for facility managers and associated maintenance professionals.

Carol Maher, ADA Facilities Manager, first entered government service in 1974 with occasional trips to the private sector. She has served as Disabled Student Coordinator for both a community college and university.

Carol has experienced a multitude of barriers in facilities ranging from automatic doors with push buttons so close to the door that they opened hitting students in the head, to ramps so steep and slippery that they were a danger to students with and without mobility issues.

Over the past seven years Carol owned her own ADA consulting firm, *Challenges*, where she had the chance to work with numerous building managers. She has provided ADA resource information to parks and recreation offices (including trails and campsites), courthouses, personnel offices, correctional facilities, restaurants, residential facilities and state offices.

Carol holds a Masters Degree in Personnel Administration with a strong background in ADA issues. On weekends she rides a ferry to Friday Harbor where she boards her 18 foot sailboat.

The two previous ADA Program Managers for the Department of General Administration (GA) set clear goals to assist GA in providing accessible buildings. Carol’s predecessors have improved access on the Capital Campus, revised and improved policies regarding ADA issues, and created the State Facilities Access Advisory Committee.

Carol will continue this process and will also include the leased facilities GA acquires for other state agencies throughout the state. A primary goal of her program is to increase the communication access between the Plant Operations Support program and the ADA office.

Plant Ops Focus Issue: Boiler safety

Poor maintenance cited as major cause of most boiler accidents

A number of issues have surfaced regarding boiler operations in Washington State. The high volume of calls concerning safety and operational factors, combined with the recent release of the 1996 Incident Report by the NBBI prompted a close look by Shop Talk.

According to figures gathered for its annual Incident Report, The National Board of Boiler and Pressure Vessel Inspectors has announced that the number of boiler and pressure-vessel related deaths in 1996 declined compared to the number of fatalities reported in 1995. The preliminary statistics were released by National Board Executive Director Albert J. Justin.

"In the 1996 reporting period, there were a total of 10 deaths. That compares to 13 deaths recorded in 1995," the National Board official explains.

Despite a drop in the number of fatalities, Justin emphasizes that there is little cause for optimism. "The loss of any life is one life too many. Over the five-year period we have been collecting data through our new incident reporting system, a total of 53 people have been killed by boiler and pressure-vessel related incidents."

Justin says that other preliminary figures gathered for the National Board report present a "troublesome" picture for boiler and pressure vessel safety.

Annual National Board incident reports are compiled from data submitted by National Board

jurisdictional authorities and authorized inspection (insurance) agencies. The leading cause of accidents, injuries and deaths in 1995 was **operator error or poor maintenance**. Nine of the reported deaths that year were attributed to this category.

"This is the area of continuing concern for the National Board," Justin emphasized. "Consistent with the fatality rate are troubling accident figures involving power boilers."

Between 1994 and 1995, accidents due to operator error/poor maintenance increased 60 percent for power boilers.

In evaluating the 1995 Incident Report, Justin said then that more emphasis must be placed on training and education to counteract human error and poor maintenance practices.

More emphasis must be placed on training and education to counteract human error and poor maintenance practices.

Information resources for hazard reduction

Regulations that may be applicable to pressure vessels; and codes and standards that may be relevant, include:

Statutes and Regulations

Section 112(r) of the **Clean Air Act** focuses on prevention of chemical accidents. It imposes on facilities with regulated substances or other extremely hazardous substances a general duty to prevent and mitigate accidental releases. Accident prevention activities include identifying hazards and operating a safe facility.

The **Environmental Protection Agency (EPA) Risk Management Program (RMP)** Rule [40 CFR 68] is intended to prevent and mitigate accidental releases of listed toxic and flammable substances. Requirements under the RMP rule include development of a hazard assessment, a prevention program, and an emergency response program.

The **Occupational Safety and Health Administration (OSHA)** has a Process Safety Management Standard, which includes regulations on tank inspection and conduct during hot-work.

Occupational Safety and Health Administration

Phone: (202) 219-8151
Public Information
Web site: <http://www.osha.gov>

Codes and Standards

The **American National Standards Institute (ANSI)** has vessel inspection standards and codes, including the **National Board Inspection Code (NBIC)**. The purpose of the NBIC is to maintain the integrity and safety of boilers and pressure vessels after

they have been placed in service by providing rules and guidelines for inspection after installation, repair, alteration, and rerating.

American National Standards Institute

655 15th St. NW
Washington, DC 20045
Phone: (202) 639-4090
or
11 West 42nd St.
New York, NY 10036
Phone: (212) 642-4900
Web site: <http://www.ansi.org>

Relevant ANSI standards

ANSI/NB 23 — 1995 National Board Inspection Code, (see also API-510).

The **American Petroleum Institute (API)** has vessel standards, guidelines, and recommended practices.

American Petroleum Institute

1220 L St. NW
Washington, DC 20008
Phone: (202) 682-8000
Web site: <http://www.api.org>

Relevant API standards

ANSI/API-510 — Pressure Vessel Inspection Code Maintenance Inspection, Rating, Repair, and Alteration, seventh edition, 1992 (covers vessels in the petroleum and chemical process industries; see also ANSI/NB 23).

Supplement 2 to ANSI/API-510 Pressure Vessel Inspection Code-Maintenance Inspection, Rating, Repair, and Alteration, December 1994 (contains

Workshops 'Provide Tools to Improve Workplace Safety and Health'

The State Department of Labor and Industries will present 27 different workshops across the state, covering topics related to safety and health, risk management, claims management and return to work. Topics such as fall protection, bloodborne pathogens, personal protective equipment, lockout/tagout and many more subjects related to plant operations will take place in all six L&I regions. The new (July 97- July 98) L&I catalogue of workshops for business and industry is now available. If you would like a hard copy, call (360) 902-5590. Detailed workshop information is also available on the Web site at <http://www.wa.gov/lni/workcomp/employer.htm>.

Also on the drawing boards for late 1997 is *Preventing Workplace Violence*. The easiest way to sign up for these workshops is to use the registration form at the back of the catalog. Include the course numbers of the workshops and the names of your employees who will be attending. A confirmation letter is sent about a week after registration. The confirmation includes the workshop address and directions to the site.

revisions to Sections I, 2, 3, 4, 5, and Appendices B and D).

ANSI/API Recommended Practice 572 — Inspection of Pressure Vessels, first edition, January 1992.

API Standard 653 — Tank Inspection, Repair, Alteration, and Reconstruction, second edition, December 1995.

ANSI/API-920 — Prevention of Brittle Fractures of Pressure Vessels, first edition, March 1990.

The **American Society of Mechanical Engineers (ASME)** has the boiler and pressure vessel code that establishes rules of safety governing the design, fabrication, and inspection during construction of boilers and pressure vessels.

American Society of Mechanical Engineers
1828 L St. NW
Suite 906
Washington, DC 20036
Phone: (800) 843-2863 or (202) 785-3756
Publications and membership: (800) 843-2763
Codes and standards: (212) 705-8500
Accreditation and certification programs: (212) 705-8581
Web site: <http://www.asme.org>

The **American Society of Nondestructive Testing (ASNT)** certifies welding and nondestructive examination (NDE) and nondestructive testing (NDT) inspectors. American Society of Nondestructive Testing
P.O. Box 28518
1711 Arlingate Lane
Columbus, OH 43228

Phone: (800) 222-2768 or (614) 274-6003
Web site: <http://www.asnt.org>

The **American Welding Society (AWS)** certifies welding inspectors with the designation AWS QC-1 (Quality Control) Welding Inspector and has guidelines on safe welding.

American Welding Society
550 NW LeJeune Road
Miami, FL 33126
Phone: (800) 443-9353 or (305)-9353
Web site: <http://www.amweld.org>

The **National Board of Boiler and Pressure Vessel Inspectors** promotes greater safety to life and property through uniformity in the construction, installation, repair, maintenance, and inspection of boilers and pressure vessels. A list of chief boiler and pressure vessel inspectors is available on the Internet or through the National Board.

National Board of Boiler and Pressure Vessel Inspectors
1055 Crupper Avenue
Columbus, OH 43229
Phone: (614) 888-8320
Web site: <http://www.nationalboard.org>

Excellent Washington state resources are **Seattle's Boiler and Pressure Vessel Inspection and Steam and Refrigeration Units**. Visit their web sites at <http://www.pan.ci.seattle.wa.us/seattle/dclu/homeblr.htm> and <http://www.pan.ci.seattle.wa.us/seattle/dclu/homelic.htm>

The **State Department of Labor and Industries** Chief Boiler Inspector office (360) 902-5578, or contact your local L&I office.

Members request closer ties with L&I

Plant Operations Support members have consistently requested better training opportunities and program liaison with L&I. Planning is underway with the South Puget Sound Chapter of the International Facilities Management Association (IFMA) to provide a "Workplace Issues Compendium" video conference in the fall. The primary objective would be to combine a number of critical L&I-related topics affecting plant managers and present/discuss at video conference sites located throughout the state.

Most plant and facility managers surveyed believe such an event would be economical, professionally enlightening and would maximize limited training time/funds. The secondary objective of the event would be to provide questions and answers to L&I program managers and inspectors. The use of video conferences to reach program members was validated and judged successful following last March's event on computerized maintenance management systems. If you have suggestions or comments on the proposed videoconference, call **Bob MacKenzie** (360) 902-7257 or e-mail bmacken@ga.wa.gov

Filter Out IAQ problems

by Thomas Capes

In part one of a three part series, learn the first of three basic aspects of filtration to develop a practical, step-by-step approach to better indoor air quality.

Just a few years ago, the topic of indoor air quality (IAQ) was virtually unknown outside of professional journals and industry trade publications. Now, it's well-known that the quality of indoor air affects everyone, and IAQ stories are becoming commonplace in popular media.

As IAQ horror stories surface from buildings across the country, building owners are asking contractors if there are any practical, short-term, and — more importantly — relatively inexpensive steps that can be taken to improve IAQ. Thankfully, there are.

IAQ is a complex topic covering a number of professional disciplines. It's complicated by the specific - often unique - needs of various indoor environments. More complexity is added to the challenge of achieving good IAQ by the fact that there is no single solution (or source) should a problem arise, and there are no unified recommendations addressing it from professional and trade organizations.

So what should a professional who is managing the operations and maintenance of HVAC systems do? Through extensive research and our experience, we believe there are three key elements that can be addressed as a potential source for IAQ issues.



Put simply, the elements are:

- Trap it
- If trapped, don't let it grow
- If not trapped, control its growth

Trap it

In this case, the *it* refers to fine particulate. There are a number of good papers discussing fine particulate and its effect on health. Some have quantified the effect of particulate on general mortality.

As you're probably aware, the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) has proposed revisions to its standard 62-1989R, *Ventilation for Acceptable Indoor Air Quality*. The standard is currently in review. This document combines recommendations on both ventilation and filtration. This is important since ASHRAE has written the standard in code language, revealing its strong stance on the benefits of combining ventilation and filtration. The recommended

minimum filtration level expressed in the new standard 52.2R is a 25% to 30% efficient pleated filter, (as rated by ASHRAE Standard 52.1, Atmospheric Dust Spot Method). The 62-1989R standard specifically recommends 60% efficiency on three micron particles. Again, this document is in review and not final. The systems addressed by this ASHRAE standard are defined as "Mechanical ventilation systems with fin tube heating coils; supply ductwork exceeding 3m (10 ft.) in length; humidifier, evaporative cooler or cooling coils."

But what should HVAC professionals do to improve IAQ regardless of the recommendations set forth in Standard 62-1989R?

The best strategy is to point their customers to the highest filtration level that makes sense. If the customer's only option, without costly equipment upgrades, is to move up from a fiberglass throw-

away filter, then that's what they should do.

While most commercial and industrial air handlers can effectively use a 90 to 95% efficient bag or rigid cell filter, IAQ issues extend to more than high levels of filtration. Maintenance of the HVAC system and the system's air filters is just as important as the efficiency of the filters. Regular preventive maintenance programs are often overlooked in the discussion of IAQ. This can be a critical oversight, as such programs demonstrate the minimal level of care and constitute due diligence of the facility manager.

The ASHRAE standard has served to add a standard of care for the HVAC community to the public record. One of the cornerstones of the rule is the documentation of regular preventive maintenance undertaken by the building owner or manager. In most well-run HVAC operations, this documentation is already in place. Making sure Plant Operations Support program members keep complete records in this area helps minimize potential for future litigation based on IAQ issues associated with the IAQ system.

Look for part two, "If trapped, don't let it grow," and part three, "If not trapped, control its growth," in future issues of Shop Talk.

Thomas Capes is a market development manager for AAF International, the manufacturer and marketer of American Air Filter products in Louisville, KY. AAF shares the Washington state contract for air filters with another vender.

Have you signed on yet?

Program list-server attracts subscribers from many occupations, states

An electronic forum for public facilities managers premiered in early May and has since attracted more than 20 "subscribers." The list-server — administered by Plant Operations Support — provides a forum for members to discuss issues, offer suggestions and ask questions. *You do not need to be a member of the Plant Operations Support consortium to subscribe.*

There is no fee involved. To subscribe, send an e-mail to <majordomo@www.wa.gov> with nothing in the subject block and only <subscribe operations>



in the message body. To remove your name from the list send to <majordomo@www.wa.gov> with nothing in the subject block and

only <unsubscribe operations> in the message body.

The list-server is becoming more active as more facility professionals become aware of its potential. Its success is driven by the number and quality of "postings."

To subscribe by the web

Visit the Plant Operations web site:
www.ga.wa.gov/plant/
operlist.htm

Follow the instructions to subscribe. If you have questions please call (360) 902-7257.

New Program Prototypes

Recycling Opportunities (POSP 0034): A collection of recycling information including: 1997 Construction Recycling Directory for King County; Ten Steps to a successful office and home recycling program; lamps and ballast Recycling; mulching and composting.

Maintenance Checklists (POSP 0035): A collection of model standards. The directives and standards from the State of Wisconsin for mechanical systems inspection with forms. A Lease renewal/Lessor maintenance checklist from the State of Washington. The state of Minnesota's Facility Audit Survey.

ADA Guidelines (POSP 0036) : The Federal Register of July 1991 and the University of California at San Diego's Policy and Procedure for Disability Access Guidelines.

Public Monuments, Policies & Procedures (POSP 0037): Art and memorial placement procedures provided by the States of Utah, Florida, Idaho, Minnesota and New Jersey.

Sign Handbooks (POSP 0038) : Signage design, lettering, construction, and specifications provided by the State of California and Washington State's draft sign standards.

K-12 School Safety Issues (POSP 0039): Includes the US Consumer Product Safety Commission's Handbook for Public Playground Safety.

Energy in the Workplace (POSP 0040): Includes flyers and informational material from the states of Oregon, South Carolina, Vermont and Washington plus comprehensive materials from the US Department of Energy.

Plant Operations Support earns national recognition

The Plant Operations Support Program, a support center and resource network for public facilities managers, has been named one of three national honorable mention winners in the 1997 Innovations Award



program of the National Association of State Facilities Administrators.

The overall winner and the honorable mention winners were recognized June 24 in Atlanta.

The subscriber-supported Plant

Operations Support Program was created in January 1996 to help public facilities managers at every level — state, city, county, K-12 schools, colleges and universities — to pool information resources, share "best practices" and "lessons learned" research, work through regulatory and legal issues, and generally assist underfunded, understaffed facilities programs.

"This award recognizes the benefits of members helping mem-

bers, and making maximum use of our limited resources," said Bob MacKenzie, program manager. "It's a tribute to the professionalism of member plant/facility managers and associated fields."

Plant Operations Support helps its member-subscribers save money on labor costs that would otherwise be spent organizing, researching, comparing, maintaining and evaluating facilities operations and projects. Members are freed up to focus on other priorities and can work smarter with existing resources.

The program has saved its members more than \$755,000 since it was created in January 1996.

Earth anchors touted as revolutionary

Accessibility, reliability and 'earth friendly' are selling points of new system

by Frank Frati, F.R.F. & Associates

The Manta Ray® anchor system is the primary, approved seismic anchor system for portable buildings in California, a state renowned for its seismic standards and rigorous certification programs. Here in the Great Northwest the anchors are proving especially beneficial in anchoring K-12 school and community college modular buildings, and for supporting poles, retaining walls and as security devices.

The anchors are driven into the ground, not augured or torqued, nor is a hole dug or drilled. There is virtually no disturbance or displacement of soil. Unlike

other anchoring systems, Manta Rays® actually compact the soil around themselves — a clean, safe and simple operation. The anchors are driven with conventional hydraulic/pneumatic equipment. Once driven to the proper depth, the rod/tendon attached to the anchor is pulled upon to reach the desired holding capacity required, which is measured by a gauge on the anchor locker. Each anchor is immediately "proof loaded" to the exact capacity required, a unique attribute of this system.

There are six Manta Ray® anchors with light- to super heavy-duty holding capacities. All anchors are made of galvanized ductile iron and can be tested to the desired holding capacity with the hydraulic anchor locker. This process literally eliminates guess work and assures applicable standards are met and maintained.

The system represents a major breakthrough in anchoring technology, with a multitude of uses in the utility, civil engineering, construction and facilities management arenas. The anchors perform a variety of roles including retaining walls, sheet piles,



seawalls, pipelines, erosion control and underwater applications. Smaller earth anchors can be used as security devices for a variety of items. Expensive picnic tables, grounds maintenance equipment, signage and other items in public settings can be economically secured with the devices. They are unnoticeable and easily installed.

Since no large equipment is needed, the anchors can be

installed in tight places, inaccessible to trucks or other equipment. This provision can be appealing to schools, ports, state agencies and others of the Plant Operations Support consortium — any public facility manager concerned with environmental, economic and effectiveness issues.

For more information on the Manta Ray® earth anchor system, contact Frank Frati, F.R.F. & Associates (360) 866-4232 or FAX (360) 866-4225

